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CAS0002(a)

SYSTEM AND METHOD FOR CREATING AN E-MAIL USAGE RECORD

FIELD OF THE INVENTION

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The present invention generally relates to communication systems, and, more particularly, to methods and systems for creating email usage records.

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BACKGROUND OF THE INVENTION

In today's communication environment, telephone calls are usually placed through a telecommunication network. When a telecommunication network detects a telephone call, a call detail record, which tracks the usage of services offered by the telecommunication carrier and records various details associated with the call, is created. Typically, the call detail record includes, for example, such items as the called number, the calling number, the date, the time, the duration of the call and other information relating to the call.

The call detail record may be stored in accordance with any one of a number of formats, such as, the Data Message Handling (DMH) standard. The DMH standard generally includes five data-containing jackets: an activity jacket, a call jacket, a segment jacket, an event jacket and a leg jacket.

25 Activity jackets contain radio resource usage data, which may include, for example, the frequency on which a wireless device is operating. Call jackets contain a record of the type of services used during a call. Segment jackets contain a record of communication network facility usage data, including, for example, trunk group usage and switch identifier usage. Event jackets

30 contain a record of the time and date the end user accessed the

communication network, as well as an authorization identifier. Finally, leg jackets contain a record concerning the routing of the call.

However, the DMH standard typically records data concerning voice calls, and may not address other telephone services, including, for example,

5 email services, paging services, end user-location detection services, content delivery services, and the services from other types of network elements.

Further, call detail records are created after the call is terminated.

10 **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a block diagram of an embodiment of a communication system in accordance with the present invention;

15 **FIG. 2** is a depiction of an email usage record in accordance with the present invention;

FIG. 3 is a flowchart of an embodiment of an email record creation routine in accordance with the present invention; and

FIG. 4 is an exemplary block diagram of another embodiment of a communication system in accordance with the present invention.

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DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

25 **FIG. 1** is a block diagram that illustrates an embodiment of a communication system **10**. The communication system **10** generally includes one or more network access devices or communication devices **12, 22**, communication networks **14, 18** and a communication node **16**. As further described below, the communication system **10** can provide various services 30 and capabilities to cellular end users, wire-line telephone end users, paging end users, satellite end users, mobile or portable telephone end users,

trunked end users, computer network end users (e.g., Internet or Intranet end users), wireless data end users, branch office end users and the like. The communication system **10** can also create an email record for recording the details of an e-mail transaction, as further described below.

- 5 The communication devices **12, 22** of the communication system **10** can be utilized by end users **20, 32** to access and/or connect with the communication node **16**. The communication devices **12, 22** can include, but are not limited to, wireline telephones, mobile telephones, paging units, radio units, wireless data devices, Web telephones, portable or wireless telephones, personal information managers (PIMs), personal digital assistants (PDAs), personal computers (PCs), network televisions (TVs), Internet TVs, Internet telephones, portable wireless devices (i.e., two-way pagers), security systems (both mobile and premises-based), workstations or any other suitable communication devices.
- 10 The communication devices **12, 22** communicate with the communication node **16** via the communication networks **14, 18**. The communication networks **14, 18** can interface with the communication devices **12, 22** through wireline or wireless networks or systems (i.e., telephone or televisions systems, Integrated Services Digital Network (ISDN) systems, coaxial lines, computer networks, digital end user lines, private networks, wireless local loop systems, etc.).
- 15 The communication networks **14, 18** of the communication system **10** can include, but are not limited to, intranets, extranets, the Internet, a Local Area Network (LAN), a telephone network, (e.g., a Public Switched Telephone
- 20 Network (PSTN), private telephone networks, etc.), a cellular network, satellite networks, a personal communication system, a TV network (e.g., a cable TV system), local, regional, national or global paging networks, an email system, a wireless data network (e.g., satellite data or local wireless data networks), a wireless LAN, a wireless local loop/distribution system (e.g.,
- 25 LMDS, MMDS or Code Division Multiple Access (CDMA) based system), a

Voice Over Internet Protocol (VOIP) network, or any other suitable network. The communication networks **14, 18** can also include a wide area network (WAN), such as, for example, the Internet, the World Wide Web (WWW) or any other similar on-line service. It will be recognized that the communication networks **14, 18** may have portions in common, may comprise two separate networks, or may be the same network.

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The communication node **16** of the communication system **10** can include, but is not limited to, an interactive voice response node, a server computer, the MIX™ platform and the Myosphere™ Service provided by **10** Motorola, Inc. of Schaumburg, IL (as further described with reference to FIG. 4), or other suitable system. It will be recognized that the communication node **16** may be integrated within or may be remote from the communication networks **14, 18**.

The communication node **16** records and maintains a call detail record, **15** as well as an email usage record. The email usage record stores information about each email transaction performed by the end user within the communication system **10**. For example, each time the end user sends an email message, the communication node **16** will record an email usage record. Preferably, each email usage record is stored within memory or a **20** database, which may be located integral with or remote from the communication node **16**.

FIG. 2 depicts an email usage record **100**. The email usage record **100** is preferably comprised of a set of data-containing jackets, with each jacket including a number of records. Each record may include a number of **25** sub-records, as further described below. The email usage record **100** may be compatible with any suitable standard, such as the DMH standard.

The email usage record **100** preferably includes an event jacket **101** and an email leg jacket **109**. The event jacket **101** and email leg jacket **109** may be compatible with the DMH standard, the Automatic Message

Accounting standard, the Bellcore Account Format standard or any other suitable standard.

The event jacket **101** and the email leg jacket **109** may include mandatory and/or optional parameters and fields depending on the operation 5 of the communication system **10**. The event jacket **101** preferably contains various information relating to the identity of the end user and the communication device, the time and/or date of the transaction, etc. It will be recognized that the event jacket **101** may contain any other suitable information. The email leg jacket **109** preferably includes the details of email 10 transactions made by an end user, such as a destination email address, a source email address, the email size, attachments, the email provider, the email urgency, the delivery schedule, the email classification, the reoccurrence of the email, recipients, the creation time and date and any delivery receipts. Thus, the email usage record **100** preferably contains an 15 event jacket **101**, and may contain, dependent upon the number of email transactions, one or more email leg jackets **109**.

As shown in **FIG. 2**, the event jacket preferably includes an end user identification record **102**, an end user number identification record **104**, an event jacket creation time record **106** and an event jacket creation date record **108**. The end user identification record **102** may be a record 20 identifying the sender of the input signal, such as the end user. The end user identification record **102** may also indicate whether the end user is authorized to use the features and services of the communication system (i.e., whether the end user is a subscriber to the communication system). Preferably, the 25 communication node compares the input signal with stored data concerning the end user. For example, the end user may be required to input a Personal Identification Number, a calling line identifier, a password or Internet "cookies" or tokens.

The end user device identification record **104** maintains and 30 authenticates the number of the communication device from which the end

user is calling. Preferably, the communication node performs a comparison between the number received in the input signal and the stored end user identification record. Upon finding a match, the communication node continues to create the email usage record 100. The event jacket creation 5 time record 106 is preferably a record of the time at which the input signal was received at the communication node (which also coincides with the time of the creation of an email usage record 100).

The event jacket creation date record 108 preferably corresponds to the calendar date on which the input signal was received by the 10 communication node (also coinciding with the creation of the email usage record 100). The communication node, when accessing an internal electronic clock, may create the event jacket creation time and date records 106, 108.

The email leg jacket 109 of the email usage record 100, which may include a link to the event jacket, preferably includes a number of records, 15 such as, for example, an email leg jacket identifier record 110, a destination email address record 112, a source email address record 114, an email size record 116, an attachment record 118, an email provider record 120, an email urgency record 122, a delivery schedule record 124, an email classification record 126, a reoccurrence record 128, a recipient record 130, an email leg 20 jacket creation time record 132, an email leg jacket creation date record 134, a delivery receipt record 136 and a bill-to record 136. Preferably, the email leg jacket includes data collected from the instruction signal, the confirmation signal and the email message itself.

The email leg jacket identifier record 110 preferably identifies the email 25 leg jacket 109 as an email message. Additionally, the email leg jacket identifier record 110 may include a link to the event jacket 101 of the current transaction. This link provides an organizational reference to the event jacket 101. As a result, if the email leg jacket 109 is stored in a location apart from the event jacket 101, there is an indication as to which transaction the email 30 leg jacket 109 corresponds.

The destination email address record **112** preferably includes information relating to the email address to which the email message was sent. The destination email address record **112** may include a number of sub-records, including, for example, an identifier sub-record, which preferably identifies the destination address signal as containing a destination email address, and a printable string sub-record, which may comprise a text version of the destination email address.

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The source email address record **114**, relating to the email address of the end user, is preferably derived from the end user's account with the communication node. Similar to the destination email address record **112**, the source email address record **114** preferably includes information relating to the email address from which the email message was sent. The source email address record **114** may include a number of sub-records, including, for example, an identifier sub-record, and a printable string sub-record.

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15 The email size record **116** preferably comprises information relating to the size of the sent email message. The email size record **116** may include a positive integer sub-record comprising the size of the email message, including, for example, the number of words or characters in the email message, the byte size of the email message, etc.

20 The attachment record **118** preferably includes information relating to any attachments that were sent with the email message. This information may include the number, size and type of the attachments. The attachment record **118** may include an identifier sub-record, a number sub-record specifying the number of attachments included with the email message, a size sub-record specifying the size of the attachments, and a type sub-record, specifying the type of the included attachments, including, for example, a word processing document, a spreadsheet or a file containing the voice message.

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30 The email provider record **120** preferably includes information relating to the Internet Service Provider (ISP) that transmits the email message. The

email provider record **120** may include an identifier sub-record and a printable string sub-record, which comprises the name of the email provider. The email provider record **120** may include information relating to the email service provider, including, for example, the name of the provider, the cost, the quality of service or the time sensitivity of the email message.

The email urgency record **122** preferably includes information relating to the priority of the delivery of the email message that corresponds to how quickly the sender wishes the email message to be sent. For example, a value of "1" may signify that the email message should be sent as soon as possible, a value of "2" may correspond to normal delivery, a value of "3" may indicate to the email provider to send the message at the lowest cost possible, and a value of "0" may indicate an unknown or unspecified urgency rating. The priority of the email message may be pre-determined by the sender of the email message or may be determined by the communication node. The email urgency record **122** may also include an identifier sub-record as well as a value sub-record corresponding to the urgency of the email message.

The delivery schedule record **124** preferably includes information relating to when the email message should be sent. The delivery schedule record **124** may include an identifier sub-record, a request date sub-record, a request time sub-record, a delivery date sub-record, a delivery time sub-record, a request execution date sub-record, a request execution time sub-record and a reoccurrence sub-record. The request date sub-record preferably specifies the date when the transaction request was made. The request time sub-record preferably specifies the time at which the transaction request was made. The delivery date sub-record preferably specifies the date of desired delivery of the email message. The delivery time sub-record preferably specifies the time of desired delivery of the email message. Finally, the reoccurrence sub-record preferably specifies whether the email

message should reoccur; that is, whether the email message will be sent more than once.

The email classification record **126** preferably comprises information relating to the classification of the email message. In this embodiment, email classification may be similar to classification of traditional mail, in which one class, for example, is designated for advertisements, and another class is designated for business mail. The email classification **126** may include an identifier sub-record as well as a value identifier sub-record corresponding to the class of the email message. For example, values may indicate that the email message is an advertisement. Other values may signify business class, non-business class or confidential email messages. Furthermore, other values may trigger additional information, including for example certified (requiring the certification by the system of email dispatch and delivery) or registered email messages (requiring dispatch and delivery certification by the system and certification by the recipient of receipt of the email message).

The reoccurrence record **128** preferably comprises information relating to whether the email message is to be sent more than once. The reoccurrence record **128** may include an identifier sub-record. In addition, the reoccurrence record **128** may include a value sub-record corresponding to the reoccurrence of the email message. For example, values may indicate the email message be sent once, etc. daily, weekly, etc.

The recipient record **130** preferably comprises information relating to the total number of recipients receiving the email message. The recipient record **130** may include an identifier sub-record and a positive integer sub-record corresponding to the number of email recipients.

The email leg jacket creation time record **132** is preferably a record of the time at which the email message was sent. The email leg jacket creation date record **134** preferably corresponds to the date on which the email message was sent. As is the case with the event jacket creation time and

date records, these two records may be obtained via the access of an internal electronic clock.

The delivery receipt record **136** will preferably contain a record specifying whether the transmitted email message requires a receipt of 5 delivery notification, i.e., a notice to the sender that the email message was delivered to and/or received by the recipient.

The bill-to record **138** preferably contains a record of which party, if any, will be billed for the transmission of the email message. The bill-to record **138** may be a “collect on delivery” type of record in cases in which the 10 receiving party is charged for receiving the email message, as sending soft products via email or providing services using email are good candidates for the receiver to pay the fare. The bill-to record **138** may contain one or more of the following “billees:” the sender, the receiver or the third party.

FIG. 3 illustrates an embodiment of a routine for creating an email 15 usage record. At block **500**, the communication node receives an input signal from the communication device. The input signal is preferably received when the end user accesses the email services of the communication node, such as, for example, dialing into the communication node from a communication device. The input signal may include a telephone number, an Electronic 20 Serial Number (ESN), a login name or password (as in the case of a PC), or any other presently known method of accessing the communication node.

Once the input signal is received at the communication node, an email usage record or event jacket is created at block **510**. One example of an email usage record is shown in **FIG. 2**. The communication node preferably 25 collects identification data from the input signal, such as the telephone number and the ESN, as well as from an internal electronic clock, and stores the identification information in the event jacket.

After creating the email usage record, the end user may perform a variety of tasks or transactions, which may include, for example, sending an 30 email message, preferably commenced by the reception of a command signal

at a communication node at block 520. The communication node may receive the instruction signal from a communication device. For example, the end user may transmit a command message to the communication node instructing the communication node to send an email message, such as, for 5 example, "Send email message to John Doe."

Alternatively, the communication node itself may generate the instruction signal. This may occur when, for example, the communication node is pre-programmed to transmit an email alert or a schedule notification. For example, the end user may program the communication node to schedule 10 an email delivery at 6:00 a.m. tomorrow. In this case, the event jacket and the email leg jacket are created when the end user instructs or programs the communication node to perform such transaction.

Once the communication node determines (or generates) a command signal, the communication node begins recording information to the email 15 usage record. After the email message has been sent, the communication node then receives a confirmation signal at block 530. The confirmation signal indicates that the email message has been sent. The reception of the confirmation signal at the communication node will preferably trigger the communication node to complete the collection of data necessary to complete 20 the email leg jacket at block 540.

Referring now to FIG. 4, an exemplary block diagram of another embodiment of a communication system 200 having the capability to create and maintain email usage records is illustrated. The communication system can implement the routine described in FIG. 3 above.

25 The communication system 200 generally includes one or more communication devices 201, 202, 203, 204, 205 (five being shown), an electronic network 206, and one or more information sources (e.g., content providers 208, 221 (two being shown) and data and voice markup language servers 209, 251, 253, 257).

The end user can access the electronic network **206** by dialing a single direct access telephone number (e.g., a foreign exchange telephone number, a local telephone number, or a toll-free telephone number or PBX) from the communication device **201**. The end user can also access the electronic 5 network **206** from the communication device **202** via the Internet **220** or WWW, from the communication device **203** via a paging network **211**, or from the communication device **205** via a LAN, a WAN, an email connection or in any other similar manner.

As shown in **FIG. 4**, the electronic network **206** includes a 10 telecommunication network **210** and a communication node **212**. The telecommunication network **210** is preferably connected to the communication node **212** via a high-speed data link, such as, for example, a T1 telephone line, a LAN, a WAN or a VOIP network. The telecommunication network **210** preferably includes a PSTN **214** and a carrier network **216**. The 15 telecommunication network **210** can also include, for example, international or local exchange networks, cable TV networks, inter-exchange carrier or long distance carrier networks, cellular networks (e.g., mobile switching centers), PBXs, satellite systems, wireless data networks and other switching centers such as conventional or trunked radio systems (not shown), etc. The 20 electronic network **206** can also include additional telecommunication networks, such as, for example, a wireless data network **207**.

The PSTN **214** can include various types of communication equipment, such as, for example, ATM networks, Fiber Distributed Data networks (FDDI), T1 lines, cable TV networks, VOIP networks and the like. The carrier network 25 **216** generally includes a telephone switching system or central office **218**.

It will be recognized that the carrier network **216** can be any suitable system that can route calls to the communication node **212**, and the central office **218** can be any suitable wire-line or wireless switching system.

The communication node **212** is preferably configured to receive and 30 process incoming calls from the carrier network **216** and the Internet **220**.

The communication node **212** can receive and process pages from the paging network **211** and can also receive and process messages (e.g., emails) from the LAN, WAN, wireless data or email system **213**.

When an end user dials into the electronic network **206** from the

5 communication device **201**, the carrier network **216** routes the incoming call from the PSTN **214** to the communication node **212** over one or more telephone lines or trunks. The incoming calls preferably enter the carrier network **216** through one or more "888" or "800" Inward Wide Area
10 Telecommunications Services trunk lines, local exchange or long distance trunk lines. It is also contemplated that the incoming calls can be received from a cable, cellular or VOIP network or any other suitable system.

The communication node **212** answers the incoming call from the carrier network **216** and retrieves an appropriate announcement (e.g., a welcome greeting) from a database, server or browser. The communication
15 node **212** then plays the announcement to the caller. In response to audio inputs from the end user, the communication node **212** retrieves information from a destination or database of one or more of the information sources, such as the content providers **208, 221** or the markup language servers **209, 251, 253, 257**. After the communication node **212** receives the information, it
20 provides a response to the end user based upon the retrieved information.

The communication node **212** can provide various dialog voice personalities (e.g., a female voice, a male voice, etc.), and can implement various grammars (e.g., vocabulary) to detect and respond to the audio inputs from the end user. In addition, the communication node **212** can
25 automatically select various speech recognition models (e.g., English, Spanish or English accent models) based upon an end user's profile, communication device and/or speech patterns. The communication node **212** can also allow the end user to select a particular speech recognition model.

When an end user accesses the electronic network **206** from a
30 communication device **201, 202, 203, 204, 205** registered with the system

(e.g., home telephone, work telephone, cellular telephone, etc.), the communication node **212** can by-pass an end user screening option and automatically identify the end user (or the type of communication device) through the use of ANI or CLI. After the communication node **212** verifies the

5 call, the communication node **212** provides a greeting (e.g., "Hi, this is your personal agent, Maya. Welcome Bob. How may I help you?"). The communication node **212** then enters into a dialogue with the end user, and the end user can select a variety of services offered by the communication node **212**.

10 When the end user accesses the electronic network **206** from a communication device not registered with the system (e.g., a payphone, a telephone of a non-end user, etc.), the communication node **212** answers the call and prompts the end user to enter his or her name and/or a personal identification number (PIN) using voice commands or DTMF signals. The

15 communication node **212** can also utilize speaker verification to identify the particular speech pattern of the end user. If the communication node **212** authorizes the end user to access the system, the communication node **212** provides a personal greeting to the end user (e.g., "Hi, this is your personal agent, Maya. Welcome Ann. How may I help you?").

20 The communication node **212** then enters into a dialogue with the end user, and the end user can select various services offered by the communication node **212**. If the name and/or PIN of the end user cannot be recognized or verified by the communication node **212**, the end user will be routed to a customer service representative.

25 Once the end user has accessed the communication system **200**, the end user may implement a wide variety of services and features by using voice commands, such as, for example, voice dialing, voice paging, facsimiles, caller announcements, voice mails, reminders, call forwarding, call recording, content information (e.g., newspapers, etc.), read email, read

30 calendars, read "to-do" lists, banking, e-commerce. The communication

system **200** can place outbound calls and pages to business and personal parties or contacts (e.g., friends, clients, business associates, family members, etc.) in response to DTMF signals or voice commands. The calls can be routed through a telephone or electronic network to the selected party

5 and the pagers can be sent to a selected party via a paging system. The communication system **200** can also receive calls routed through a telephone or electronic network.

As shown in FIG. 4, the communication node **212** preferably includes a telephone switch **230**, a voice or audio recognition (VRU) client **232**, a VRU

10 server **234**, a controller or call control unit **236**, an Operation and Maintenance Office or a billing server unit **238**, a LAN **240**, an application server unit **242**, a database server unit **244**, a gateway server or router firewall server unit **246**, a VOIP unit **248**, a voice browser **250**, a voice markup language server **251**, a messaging server **255** and a data markup language

15 server **253**. Although the communication node **212** is shown as being constructed with various types of independent and separate units or devices, the communication node **212** can be implemented by one or more integrated circuits, microprocessors, microcontrollers or computers which may be programmed to execute the operations or functions equivalent to those

20 performed by the devices or units shown. It will also be recognized that the communication node **212** can be carried out in the form of hardware components and circuit designs and/or software or computer programs.

The communication node **212** can be located in various geographic locations throughout the world or the United States (e.g., Chicago, IL). The

25 communication node **212** can be operated by one or more carriers (e.g., Sprint, Qwest, MCI, etc.) or independent service providers (e.g., Motorola, Inc.).

The communication node **212** can be integrated with the carrier network **216** or can be located remote from the carrier network **216**. It is also

30 contemplated that the communication node **212** may be integrated into a

communication device, such as, for example, a wire-line or wireless telephone, a radio device, a PC, a PDA, a PIM, etc., and can be programmed to connect or link directly to an information source.

The communication node **212** can also be configured as a standalone system to allow end users to dial directly into the communication node **212** via a direct access telephone number. In addition, the communication node **212** may comprise a telephony switch (e.g., a PBX or Centrix unit), an enterprise network or a LAN. In this configuration, the communication system **200** can be implemented to automatically connect an end user to the communication node **212** when the end user accesses a communication device.

When the telephone switch **230** receives an incoming call from the carrier network **216**, the call control unit **236** sets up a connection in the telephone switch **230** to the VRU client **232**. The communication node **212** then enters into a dialog with the end user regarding various services and functions. The VRU client **232** preferably generates pre-recorded voice announcements and/or messages to prompt the end user to provide inputs to the communication node **212** using voice commands or DTMF signals.

In response to the inputs from the end user, the communication node **212** retrieves information from a destination of one of the information sources and provides outputs to the end user.

The telephone switch **230** is preferably connected to the VRU client **232**, the VOIP unit **248** and the LAN **240**. The telephone switch **230** receives incoming calls from the carrier network **216**. The telephone switch **230** also receives incoming calls from the communication device **202** routed over the Internet **220** via the VOIP unit **248**. The telephone switch **230** also receives messages and pages from communication devices **203**, **205**, respectively. The telephone switch **230** is preferably a digital cross-connect switch, Model LNX, available from Excel Switching Corporation, Hyannis, MA. It will be recognized that the telephone switch **230** can be any suitable switch.

The VRU client **232** is preferably connected to the VRU server **234** and the LAN **240**. The VRU client **232** processes voice communications, DTMF signals, pages and messages (e.g., emails). Upon receiving voice communications, the VRU client **232** routes the speech communications to the VRU server **234**. When the VRU client **232** detects DTMF signals, it sends a command to the call control unit **236**. It will be recognized that the VRU client **232** can be integrated with the VRU server **234**.

The VRU client **232** preferably comprises a PC, such as, for example, a Windows NT compatible PC, with hardware capable of connecting individual telephone lines directly to the telephone switch **230** or carrier network **216**. The VRU client **232** preferably includes a microprocessor, random access memory, read-only memory, a T1 or ISDN interface board, and one or more voice communication processing boards (not shown). The voice communication processing boards are preferably Dialogic boards, Antares Model, available from Dialogic Corporation, Parsippany, NJ. The voice communication boards may include a voice recognition engine having a vocabulary for detecting a speech pattern.

The voice recognition engine is preferably a RecServer software package, available from Nuance Communications, Menlo Park, CA. The VRU client **232** can also include an echo canceler (not shown) to reduce or cancel TTS or playback echoes transmitted from the PSTN **214** due to hybrid impedance mismatches. The echo canceler is preferably included in an Antares Board Support Package, also available from Dialogic.

The call control unit **236** is preferably connected to the LAN **240**, and sets up the telephone switch **230** to connect incoming calls to the VRU client **232**. The call control unit **236** also sets up incoming calls or pages to the communication node **212** over the Internet **220** and pages and messages sent from the communication devices **203, 205** via the paging network **211** and email system **213**, respectively. The control call unit **236** preferably comprises a PC, such as, for example, a Windows NT compatible PC.

The LAN 240 allows the various components and devices of the communication node 212 to communicate with each other via twisted pair, fiber optic, coaxial cables or the like. The LAN 240 may use Ethernet, Token Ring or other suitable types of protocols. The LAN 240 is preferably a 100 5 Megabit per second Ethernet switch, available from Cisco Systems, San Jose, CA, and can comprise any suitable network system. The communication node 212 may include a plurality of LANs.

The VRU server 234 is connected to the VRU client 232 and the LAN 240. The VRU server 234 receives voice communications from the end user 10 via the VRU client 232. The VRU server 234 processes the voice communications and compares the voice communications against a vocabulary or grammar stored in the database server unit 244 or a similar memory device.

The VRU server 234 provides output signals, representing the result of 15 the voice communications processing, to the LAN 240. The LAN 240 routes the output signal to the call control unit 236, the application server unit 242 and/or the voice browser 250. The communication node 212 then performs a specific function associated with the output signals.

The VRU server 234 preferably includes a TTS unit 252, an automatic 20 speech recognition (ASR) unit 254, and a STT unit 256. The TTS unit 252 receives textual data or information (e.g., email, web pages, documents, files, etc.) from the application server unit 242, the database server unit 244, the call control unit 236, the gateway server unit 246, the application server unit 242 and the voice browser 250. The TTS unit 252 processes the textual data 25 and converts the data to voice data or information.

The TTS unit 252 can provide data to the VRU client 232, which reads or plays the data to the end user. For example, when the end user requests information (e.g., news updates, stock information, traffic conditions, etc.), the communication node 212 retrieves the desired data (e.g., textual information)

from a destination of the one or more of the information sources and converts the data via the TTS unit 252 into a response.

The response is then sent to the VRU client 232. The VRU client 232 processes the response and reads an audio message to the end user based 5 upon the response. It is contemplated that the VRU server 234 can read the audio message to the end user using human recorded speech or synthesized speech. The TTS unit 252 is preferably a TTS 2000 software package, available from Lernout and Hauspie Speech Product NV, Burlington, MA.

The ASR unit 254 provides speaker dependent or independent 10 automatic voice recognition of voice communications from the end user. It is contemplated that the ASR unit 254 can include speaker dependent voice recognition. The ASR unit 254 processes the voice communications to determine whether a word or a speech pattern matches any of the grammars or vocabulary stored in the database server unit 244 or downloaded from the 15 voice browser 250. When the ASR unit 254 identifies a selected speech pattern of the voice communications, the ASR unit 254 sends an output signal to implement the specific function associated with the recognized speech pattern. The ASR unit 254 is preferably a speaker independent voice 20 recognition software package, RecServer Model, also available from Nuance Communications. It is contemplated that the ASR unit 254 can be any suitable voice recognition unit to detect voice communications.

The STT unit 256 receives voice communications and converts the voice communications to textual information (e.g., a text message). The textual information can be sent or routed to the communication devices 201, 25 202, 203, 204, 205, the content providers 208, 221, the markup language servers 209, 251, 253, 257, the voice browser 250 and the application server unit 242. The STT unit 256 is preferably a Naturally Speaking software package, available from Dragon Systems, Newton, MA.

The VOIP unit 248 is preferably connected to the telephone switch 230 30 and the LAN 240. The VOIP unit 248 allows an end user to access the

communication node **212** via the Internet **220** or VOIP public network using voice commands. The VOIP unit **248** can receive VOIP protocols (e.g., H.323 protocols) transmitted over the Internet **220** or Intranet, and can convert the VOIP protocols to voice information or data. The voice information can then 5 be read to the end user via the VRU client **232**.

The VOIP unit **248** can also receive voice communications from the end user and convert the voice communications to a VOIP protocol that can be transmitted over the Internet **220**. The VOIP unit **248** is preferably a Voice Net software package, also available from Dialogic Corporation. It will be 10 recognized that the VOIP unit **248** can be incorporated into a communication device.

The communication node **212** also includes a detection unit **260**. The detection unit **260** is preferably a phrase or key word spotter unit, detecting incoming audio inputs or communications or DTMF signals from the end user. 15 The detection unit **260** is preferably incorporated into the telephone switch **230**, but can be incorporated into the VRU client **232**, the carrier network **216** or the VRU server **234**. The detection unit **260** is preferably included in a RecServer software package, also available from Nuance Communications.

The detection unit **260** records the audio inputs from the end user and 20 compares the audio inputs to the vocabulary or grammar stored in the database server unit **244**. The detection unit **260** continuously monitors the end user's audio inputs for a key phase or word after the end user is connected to the node **212**. When the detection unit **260** detects the key phrase or word, the VRU client **232** plays a pre-recorded message to the end 25 user. The VRU client **232** then responds to the audio inputs provided by the end user.

The billing server unit **238** is preferably connected to the LAN **240**. The billing server unit **238** can record data about the use of the communication node **212** by an end user (e.g., length of calls, features 30 accessed by the end user, etc.). Upon completion of a call by an end user,

the call control unit **236** sends data to the billing server unit **238**. The billing server unit **238** can subsequently process the data in order to prepare customer bills. The billing server unit **238** can use the ANI or CLI of the communication device to properly bill the end user. The billing server unit

5 **238** preferably comprises a Windows NT compatible PC.

The gateway server unit **246** is preferably connected to the LAN **240** and the Internet **220**. The gateway server unit **246** provides access to the content provider **221** and the voice markup language server **257** via the Internet **220**. The gateway server unit **246** allows end users to access the

10 communication node **212** from the communication device **202** via the Internet **220**. The gateway server unit **246** can function as a firewall to control access to the communication node **212** to authorized end users. The gateway server unit **246** is preferably a Cisco Router, also available from Cisco Systems.

The database server unit **244** is preferably connected to the LAN **240**.

15 The database server unit **244** preferably includes a plurality of storage areas to store data relating to end users, such as, for example, speech vocabularies, dialogs, personalities, end user entered data, email usage records, and other information. Preferably, the database server unit **244** stores a personal file or address book. The personal address book can

20 contain information required for the operation of the communication system **200**, including end user reference numbers, personal access codes, personal account information, contact's addresses, telephone numbers, etc. The database server unit **244** is preferably a PC, such as, for example, a Windows NT compatible PC.

25 The application server unit **242** is preferably connected to the LAN **240** and the content provider **208**. The application server unit **242** allows the communication node **212** to access information from a destination of the information sources, such as the content providers **208, 221** and the markup language servers **209, 251, 253, 257**. For example, the application server

30 unit **242** can retrieve information (e.g., weather reports, stock information,

traffic reports, restaurants, flower shops, banks, calendars, "to-do" lists, e-commerce, etc.) from a destination of the information sources. This application server unit **242** may include Starfish Software to provide the address book, calendar and to-do lists, and to allow the end user to organize

5 information. The application server unit **242** processes the retrieved information and provides the information to the VRU server **234** and the voice browser **250**. The VRU server **234** can provide an audio announcement to the end user based upon the information using TTS synthesizing or human recorded voice. The application server unit **242** can also send tasks or

10 requests (e.g., transactional information) received from the end user to the information sources (e.g., a request to place an order for a pizza). The application server unit **242** can further receive end user inputs from the VRU server **234** based upon a speech recognition output. The application server unit **242** is preferably a PC.

15 The voice markup language server **251** is preferably connected to the LAN **240**. The voice markup language server **251** can include a database, scripts and markup language documents or pages. The voice markup language server **251** is preferably a PC, such as, for example, a Windows NT compatible PC. It will also be recognized that the voice markup language server **251** can be an Internet server (e.g., a Sun Microsystems server).

20 The messaging server **255** is preferably connected to the LAN **240**, the paging network **211**, an email system **213** and a short message system (SMS) **290**. The messaging server **255** routes pages between the LAN **240** and the paging network **211**. The messaging server **255** is preferably a PC, such as, for example, a Windows NT compatible PC. The messaging server **255** can also provide direct storage. It is contemplated that the messaging server **255** can reside externally from the communication node **212**.

25 The voice browser **250** is preferably connected to the LAN **240**. The voice browser **250** preferably receives information from the markup language servers **209, 251, 253, 257**, the database server unit **244** and the content

providers **208, 221**. In response to voice commands or DTMF signals, the voice browser **250** generates a content request (e.g., an electronic address) to navigate to a destination of one or more of the information sources. The content request can use at least a portion of a Uniform Resource Locator, an 5 Internet Protocol, a page request, or email.

After the voice browser **250** is connected to an information source, the voice browser **250** preferably uses a Transmission Control Protocol/Internet Protocol connection to pass requests to the information source. The information source responds to the requests, sending at least a portion of the 10 requested information, represented in electronic form, to the voice browser **250**. The information can be stored in a database, and can include text content, markup language document or pages, non-text content, dialogs, audio sample data, recognition grammars, etc. The voice browser **250** then parses and interprets the information, further described below. The voice 15 browser **250** can be integrated into the communication devices **201, 202, 203, 204, 205**.

As shown in **FIG. 4**, the content provider **208** is connected to the application server unit **242** of the communication node **212**, and the content provider **221** is connected to the gateway server unit **246** of the 20 communication node **212** via the Internet **220**. The content providers **208, 221** can store various content information, such as, for example, news, banking, commerce, weather, traffic conditions, etc. The content providers **208, 221** can include a server to operate WWW pages or documents in the form of a markup language. The content providers **208, 221** can also include 25 a database, scripts and/or markup language documents or pages. The scripts can include images, audio, grammars, computer programs, etc. The content providers **208, 221** execute suitable server software to send requested information to the voice browser **250**.

The voice mail unit **274** is preferably connected to the telephone switch 30 **203** and the LAN **240**. The voice mail unit **274** can store voice mail

messages from parties trying to send messages to the communication node 212. When an end user accesses the electronic network 206, the voice mail unit 274 can notify the end user of new and stored messages. The end user can access the messages to play, delete, store and forward the messages.

- 5 When the end user accesses a message, the message can be read to the end user or can be displayed as textual information on a communication device (e.g., a pager, a SMS 290, or a PDA, etc.). The end user can also access and operate external messages or mail systems remote from the electronic network 206.
- 10 The FAX server unit 272 is preferably connected to the telephone switch 230 and the LAN 240. The FAX server unit 272 receives and stores facsimile information sent via the electronic network 206 or the carrier network 216. Subscribers can access the facsimile information to play, store, delete, and forward the information. The facsimile information can be read
- 15 via the TTS unit 252 or can be displayed as textual information on a suitable communication device. The FAX server unit 272 preferably comprises a PC, such as, for example, a Windows NT compatible PC or a Dialogue Fax Server.

Further information regarding communication system 200 is disclosed
20 in U.S. Patent Application No. 09/141,485, entitled Telecommunication System and Methods Therefor, filed August 27, 1998, the entire disclosure of which is incorporated herein.

It should be appreciated that the embodiments described above are to be considered in all respects only illustrative and not restrictive. The scope of
25 the invention is indicated by the following claims rather than by the foregoing description. All changes that come within the meaning and range of equivalents are to be embraced within their scope.